REPORT OF CASES IN WHICH THE BACILLUS AËROGENES CAPSULATUS WAS FOUND.

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IN November, 1891, Dr. Welch reported the discovery of a gas-producing bacillus in the blood and tissues of a man who died after the rupture of an aneurism of the aorta. In 1892, Welch and Nuttall [1] published a careful study of this organism, which they named the bacillus aërogenes capsulatus. Their description was so complete that little has been added by subsequent investigators. Dunham,[2] in 1897, showed that the bacillus aërogenes capsulatus produced spores on blood serum. But even this is not a constant feature, and spore production has not been observed in any of our cases. In 1893, E. Fraenkel [3] demonstrated that the organism was the cause of gaseous phlegmons. In 1896, Welch and Flexner,[4] in an elaborate paper, showed that the organism had marked pathogenic properties and was the cause of a variety of pathological processes. Doubtless the gas bacillus is a more common and widespread infectious agent than is generally supposed. Bloodgood [5] has recently collected 22 cases of emphysematous phlegmon due to this organism.

Five * cases of invasion of the body by the bacillus aërogenes capsulatus have been observed at the Boston City Hospital during the past eighteen months. Two of these were surgical infections and are reported by Dr. Thorndike in this number of the JOURNAL. In the remaining three cases the micro-organism was found at autopsy, (1) in the blood and tissues of a man whose liver was ruptured by a fall; (2) in the pus of multiple abscesses of the liver; (3) in the fibrinopurulent exudate in a case of general peritonitis.

CASE I. RUPTURE OF LIVER; DEATH IN TWELVE HOURS; BACILLUS AËROGENES CAPSULATUS IN BLOOD AND EMPHYSEMATOUS TISSUES.

Foster C., age twenty-six years. Admitted to Dr. Burrell's service at the Boston City Hospital, January 5, 1899, in a state of shock. Early that morning he had fallen the distance of two stories, striking on his left side and abdomen. It was found that he had fractured three ribs. Internal injuries were suspected. The bladder was irrigated with boracic acid. The fluid came back clear. He went into a condition of collapse, and, although stimulated, failed to rally, and died the same day at 6 P. M.

Autopsy (99.3) by Dr. Mallory, sixteen hours after death. Body 169 centimetres long; very stoutly built; rigor mortis marked. Lividity of face, neck, upper part of thorax, and dependent portions of body. Subcutaneous tissues of neck, upper part of thorax and lower portions of abdomen emphysematous. No evidence of post-mortem decomposition. Peritoneal cavity contains about 300 cubic centimetres of fluid and clotted blood. Peritoneum covering intestine beaded with small vesicles containing gas. Pleural cavities free from adhesions except over right apex, where several old fibrous adhesions are present. Pericardial cavity contains an excess of fluid; the serosa is stained red due to diffuse inhibition of blood coloring matter. Surface of heart shows everywhere beneath the pericardium minute bubbles of gas. Lungs are congested. A few interstitial blebs present. No evidence of any injury to lung. Heart: Weight, 340 grammes. Valves and cavities normal. Many bubbles of gas of various sizes beneath endocardium, especially of left ventricle. No gas in the heart's cavities or in the blood-vessels. Spleen: Weight, 210 grammes. Rather firm; on section lymph nodules fairly distinct; pulp dark in color. Gastro-intestinal tract: Stomach empty. Nothing unusual found in mucous membrane of intestine.

Liver: Weight, 2,560 grammes. In the left lobe is a long curved fissure beginning at the insertion of the round ligament and running parallel with the anterior border of the left lobe for a distance of 16 centimetres, and from three to four centimetres above it. In the right lobe is a similar fracture running parallel to the right border and five centimetres from it. It begins six and a half centimetres from the anterior edge of the liver and runs backward nine centimetres, and then extends at right angles and reaches almost to the right edge of the liver. The fracture of the left lobe extends through to the capsule on the under surface. There is another extensive fracture on the under surface of the left lobe running from before backwards across the middle. It begins near the anterior edge and runs back 14 centimetres, and then extends three centimetres towards the lower border of the liver. There is another extensive fracture beginning near the angle formed by the fracture just described and extending five centimetres, just up to the point of entrance of the portal vein. Still another fracture extends posteriorly from the portal vessels almost to the attachment of the diaphragm. On section, liver substance yellowish; lobules made out with difficulty.

Kidneys: Combined weight, 300 grammes. Apparently perfectly normal. Bladder empty beyond about two cubic centimetres of a turbid secretion evidently due to desquamation of epithelial cells. Testicles normal; adrenals normal. Pancreas large; small tear in the upper surface near the head, filled with small amount of clotted blood. Brain could not be examined. Organs of neck normal beyond some emphysema of the connective tissues. The seventh, eighth and ninth ribs on the left side, in the axillary line, are fractured. Aorta: A few slightly elevated yellowish streaks along posterior wall. Intima of aorta stained red with blood coloring matter. Subpericardial tissues where the gas bubbles are present and the emphysematous tissue over upper portion of thorax show the presence of numerous large bacilli, morphologically identical with the gas bacillus of Welch. They stain by Gram's method.

Anatomical diagnosis. — Multiple fractures of liver with hemorrhage into abdominal cavity; fracture of pancreas, fracture of seventh, eighth and ninth ribs on left side; extensive emphysema due to the bacillus aërogenes capsulatus; fatty infiltration of liver; fragmentation of the myocardium.

Bacteriological examination.— Twelve anaërobic cultures were made on various media from different parts of the body. In these there was a scanty growth, if any at all, of the large bacillus present in the cover-slip preparations. In none of the tubes was it found in pure culture. Attempts to grow it by transplanting from the original cultures and by animal inoculation failed. Some gas blebs appeared in a glucose agar tube inoculated with blood from the liver. A cover-slip preparation showed the bacillus in small numbers, and a variety of other organisms. There was no gas formation in glucose bouillon, contained in a Smith fermentation tube, nor in a gelatine stab culture inoculated with blood from the heart.

The organism was found in the original cultures from the following situations: Heart's blood, spleen, liver, lung, trachea, intestinal contents, subcutaneous fat over thorax, pectoralis major muscle. Aërobic cultures upon blood serum were made from the heart's blood, spleen, liver and kidney. In all the streptococcus pyogenes was present, and in addition a growth of a white staphylococcus was obtained from the liver and heart's blood. In the water of condensation of each tube were large bacilli, staining by Gram, and morphologically identical with those pres-

* Since this paper left our hands another case has occurred. At autopsy, in a patient dead of cerebral hemorrhage, on section of the liver some bubbles of gas escaped from the blood-vessels. Cover-slips showed an organism identical morphologically with the gas bacillus. There were no gas blebs in the liver. Some of the blood was inoculated into a rabbit and typical emphysema developed. A capsulated bacillus was recovered from its blood in pure culture which possessed the characteristics of the bacillus aërogenes capsulatus.

ent in the anaërobic cultures. These bacilli were not present on the surface growth of any of the aërobic tubes. As the blood contained vast numbers of the bacillus, it is not improbable that those found in the cultures were simply transferred from the tissues, and that no multiplication occurred upon the artificial media.

Microscopical examination. — Tissues were fixed in Zenker's fluid, imbedded in paraffine, and then stained with eosin followed by Unna's alkaline methylene blue. Heart: There is a marked fragmentation of many of the muscle cells. Often there is a space of twenty or thirty microns between the broken ends. Sometimes the fracture is near the end of a cell, sometimes near the centre. There are no areas of necrosis. The striæ of the muscle cells are well shown. The capillaries are congested. They contain a very few large bacilli. There are none of the organisms in the tissue outside of the blood-vessels. Blood clot from the heart shows large masses of the bacilli. They are also scattered diffusely throughout the fibrin in great number. Pectoralis major muscle: The muscle fibres appear normal. The veins are distended and contain a great number of the bacilli. Some vessels are apparently completely occluded by them. Here and there in the connective-tissue septa are large masses of the organisms; no other forms of bacteria are seen.

Lung: There is a serous exudate and some hemorrhage into the alveoli. The blood-vessels are congested; they contain great masses of bacilli; the alveoli also contain them, but in less number. No organisms are present in the bronchial tubes. Spleen: Contains much blood and there are large numbers of bacilli in the splenic pulp. Some of the cells of the lymph nodules show degenerative changes. In the lumina of the larger veins are a great many of the organisms.

Liver: Marked fatty infiltration. No bacilli in bile-ducts; fairly numerous in portal vein.

Kidney: The epithelium of many of the convoluted and straight tubules takes the stain poorly or not at all. The blood-vessels are moderately congested and contain the bacilli. The bacterium found in all the organs is a large, thick bacillus with square or slightly rounded ends; occasionally leptothrix-like forms are seen. It stains somewhat irregularly with methylene blue and also with aniline-gentian violet. It is not decolorized by Gram's method. No spores are demonstrable.

This case presents a puzzling but interesting feature. There was marked subcutaneous emphysema associated with the presence of a bacillus morphologically identical with the bacillus aërogenes capsulatus. Cover-slip preparations and tissues from various parts of the body show that this organism was present in great number, yet it was not possible to grow it upon artificial media. That the bacilli were dead when the autopsy was performed is, we think, the true explanation of these facts. Immediately after death the body was placed in the cold-storage room of the mortuary, where the temperature is usually maintained in winter a few degrees above the freezing point, but frequently falls, especially at night, to 26° F. The body was in the cold chamber sixteen hours. Of course some time elapsed before the deeper portions were cooled to the temperature of the refrigerator.

That the vitality of the gas bacillus is quickly destroyed by cold was recognized by Welch and Flexner. They record the following observations: In a case of inflammation of the urinary tract, "cover-slips from renal abscesses, renal pelvis, ureters, bladder, and perineal wound, showed a large number of bacilli with the morphology of the gas bacillus. . . . Contrary to our custom, cultures were not made at the time of the autopsy, but the organs, wrapped in wet cloths, were put on ice. Culture tubes inoculated the following day did not show the gas bacillus." In another case, "Dr. Blumer cultivated the gas bacillus from the kidney at the autopsy, and the following day failed to obtain it in cultures from the same organ, which had remained during twenty-four hours wrapped in wet cloths on ice."

The portal of invasion in our case is doubtful, but as the organism was found in the intestinal contents, it is not improbable that in the fall the walls of the intestine were so injured that the gas bacilli were able to pass into the circulation. The widespread distribution of the gas bacillus would indicate that it entered the circulation during life, but its multiplication was probably chiefly post mortem, before the body was sufficiently cooled to inhibit its growth.

CASE II. CARCINOMA OF COMMON BILE-DUCT; CHOLOTOMY; MULTIPLE ABSCESSES OF LIVER, FROM WHICH THE BACILLUS AËROGENES CAPSULATUS WAS ISOLATED.

Nathaniel R., age sixty-three years; rope maker. Admitted to the service of Dr. Thorndike, September 10, 1899. Family history negative. Personal history negative. Present illness began two weeks ago, with an attack of sharp pain localized in the epigastrium. This was followed by nausea, vomiting, and a severe chill. Since that time the patient has been constipated and has had no appetite. One week ago his urine became dark-colored, and at about the same time he became jaundiced. The diagnosis of obstruction of the common duct was made. At operation, eight days later, the gall-bladder was found considerably distended with bile and surrounded by adhesions. It contained two pea-sized black concretions. The obstruction was not located. The gall-bladder was sutured to the abdominal wall and drained with iodoform gauze. The patient appeared to improve until the fourth day, when vomiting set in, with considerable epigastric pain. Inability to retain anything taken by mouth continued until the patient's death, seven days after the operation.

Autopsy (99.156) by Dr. Fulton, thirteen hours post mortem. Body of a man sixty-three years of age, fairly well developed, but poorly nourished. Length, 172 centimetres. Marked rigor mortis. Much lividity of dependent parts. A marked general jaundice. No subcutaneous edema. No caput medusæ. No dilatation of superficial vessels. No enlargement of the axillary lymph nodes. About six centimetres to the right of the median line and on a level with the umbilicus is a closed linear incision, seven centimetres in length, extending upward and outward. Peritoneum smooth. Appendix vermiformis 11 centimetres in length, free, extends down into the pelvis. Its lumen is patent throughout. Mesenteric lymph nodes not enlarged. Pleural cavities: Lungs are adherent in many places by strong fibrous bands. Pericardial cavity smooth, contains a few cubic centimetres of straw-colored fluid. Heart: Weight, 315 grammes. The muscle is soft, brown, and on section shows a number of small, firm, whitish, irregular areas, some of them three to four millimetres in diameter. Coronary arteries smooth; valves normal. Frozen section shows very slight amount of fat and an abundance of brown pigment.

Lungs: Voluminous; the right larger than the left. Posterior portions are dark-colored and on section are moist, exuding a frothy fluid on pressure. Anterior portions are dry on section and in general deeply pigmented. Bronchial mucosa is deeply congested and covered with a thick layer of mucus. Bronchial lymph nodes are much enlarged, very black, some of them calcified. Spleen: Weight, 230 grammes. Capsule is smooth for the most part, but is adherent over its posterior portion. It is firm, and on section is grayish red. Malpighian bodies are prominent and trabeculæ easily seen. There is no increase in pulp. Stomach normal. Intestines: Small intestine contains a slimy, dark, greenish material. The colon is filled with light, clay-colored feces.

Liver: Weight, 200 grammes; dark red; friable; mark-

ings distinct. Here and there over the surface are small whitish areas, the largest three by four millimetres, which, when cut into, exude a grayish-white purulent material. A smear from this shows many pus cells and numerous large bacilli, with rounded ends, staining by Gram's method. On section these areas are seen in considerable numbers throughout the liver. The walls of these abscesses are fairly well defined and have a greenish, translucent appearance. The gall-bladder is the seat of an operation. The intestines are closely adherent to it and to each other in this region. It has been incised and contains no bile. The incision contains two small pieces of gauze drainage. The common duct is dilated throughout its length, the circumference being 4.5 centimetres. Just beneath the papilla biliaria is a small, firm nodule about one centimetre in diameter, which is freely movable beneath the mucosa, and is not attached to the pancreas. The gastrohepatic lymph nodes are enlarged, some measuring 1.5 centimetres in length. The opening of the common duct admits a probe with some difficulty. The pancreatic duct is dilated, having a lumen of about three to four millimetres, from which a clear fluid drops on section. The inferior portion of the pancreas is hard and nodular, and, for the most part, pale and homogeneous on section, but shows one small yellow patch about two millimetres in diameter. Retroperitoneal lymph nodes enlarged and very firm; the largest measure about two centimetres in length. On section they are pale, dry and homogeneous.

Kidneys: Weight, 290 grammes. Capsule slightly adherent, leaving a granular surface when stripped off. Tissue pale red; diminished consistence. Cortex measures three to four millimetres. On section, surface pale; the glomeruli appear as minute red points, and the cortex and the pyramids are not well differentiated. Some fat in the cells of the tubules. Adrenals normal. Bladder normal. Genitalia normal. Aorta: A few scattered, irregular, white, raised patches on the intima. In the thoracic portion is a small patch of calcification, measuring about one centimetre in diameter. Thyroid normal. Tracheal lymph nodes slightly enlarged.

Anatomical diagnosis. — Carcinoma of the common bile-duct with involvement of pancreas and retroperitoneal lymph nodes; multiple abscesses of liver; dilatation of pancreatic and common bile-ducts; chronic diffuse nephritis; chronic fibrous myocarditis; chronic fibrous pleuritis; chronic localized fibrous peritonitis; brown atrophy of heart; jaundice; cholecystotomy.

Bacteriological examination.— Smears from the liver abscesses stained by Gram's method show many well-preserved pus cells, large numbers of large bacilli, straight with rounded ends, staining deeply. A good many medium-sized bacilli with rounded ends, which decolorize, and a few scattered cocci occasionally in pairs retaining the stain. A few of those, morphologically like the large ones, decolorize. Anaërobic cultures in milk, agar, and bouillon all showed the three forms above mentioned. Two loopfulls from the surface of an agar culture were suspended in about one centimetre of bouillon, and injected into the ear vein of a rabbit which was killed in fifteen minutes, put in the thermostat at a temperature of 36°, and left for twenty hours.

Autopsy. — Abdomen of the animal greatly distended; marked general subcutaneous emphysema, particularly over thorax and inner side of thighs. Abdomen punctured with a trocar. The escaping gas burns with a blue, extremely hot flame for one minute. Smears from the subcutaneous tissues show the large bacilli in considerable numbers. Gas blebs abundant in the subcutaneous connective tissues. Small amount of serosanguinous fluid containing oil droplets in the peritoneal cavity. Fundus of stomach and spleen congested. Thorax contains much gas. Lungs greatly collapsed. Heart and large arteries and veins contain gas. Heart's blood contains many characteristic large bacilli. Lungs contain many bacilli. Liver very friable, a few gas blebs seen on surface and bubbles can be squeezed from it. Gall-bladder shows bacilli in smears. Kidney pale, granular and friable, containing no gas but many bacilli. Cultures made from heart's blood, peritoneum and liver. In most of the cultures the three organisms are found. In the cultures from the peritoneum the large bacillus predominates. There is much gas produced in the water of condensation and in the agar. Milk is coagulated, decolorized, and digested. The organism produces characteristic colonies on blood serum. The medium-sized bacillus which decolorized by Gram's method is motile in twenty-four-hour cultures, acidifies milk, grows diffusely on potato, produces gas in glucose bouillon, forms indol in glucose-free bouillon and does not liquefy gelatine. It is the bacillus coli communis. The lanceolate coccus is often in pairs, forms minute pin-point translucent colonies on blood serum, shows a very slight growth on potato, coagulates and decolorizes milk, produces no gas and no indol. In ten days gelatine is liquefied along the stab and also over the entire surface to the depth of one centimetre. A guinea-pig, weighing 100 grammes, was inoculated subcutaneously with one cubic centimetre of a twenty-four-hour culture; no symptoms developed. It is a non-pathogenic organism not identified. Cultures from heart's blood and spleen negative. Kidney and lung contain a diplococcus, with the same characteristics as that in the liver, and the colon bacillus.

Microscopical examination.— Tissues were fixed in Zenker's fluid, imbedded in paraffine, and stained with eosin followed by Unna's methylene blue. Sections of the liver show a slight cirrhosis, but the chief interest is in the abscess formation. In each of these is an area of necrotic, structureless material, portions of it hyaline, staining deeply with eosin, portions finely granular, staining with methylene blue. Immediately surrounding this are numerous poorly preserved polynuclear leucocytes and some phagocytic cells. Surrounding the abscess is an ill-defined wall composed of connective tissue containing a few liver cells and infiltrated with leucocytes and many eosinophiles. Beginning abscesses are seen in connection with the bile-ducts. In some cases the ducts are simply dilated with leucocytes, while the epithelium remains intact. In others, farther advanced, the epithelial wall remains on only one side of the abscess. About the ducts the tissue contains many plasma cells and numerous eosinophiles. From these appearances, it seems fair to assume that the infection entered by way of the bile passages. No bacteria are found in the sections except some which are morphologically and in staining reaction like the gas bacillus. Even these are not very abundant. They are found in connection with the abscesses and some are within the bile-ducts.

This case resembles closely that reported by Larkin[6] in which there was obstruction of the common duct and multiple hepatic abscesses. In connection with the fact that no gas formation took place in the liver, two of the cases mentioned by Bloodgood[5] are of interest. One was a laceration of the scrotum in which the gas bacillus was found in the tissues but was unaccompanied by emphysema. The other was a case of infection after ligation of the femoral artery for a popliteal aneurism. Gangrene of the leg followed the operation. Symptoms of infection accompanied by emphysema of the tissues appeared on the tenth day. The gas bacillus was found and the leg was amputated. Two months later a second amputation was done for the granulating stump. The bacillus aërogenes capsulatus was again found in a small subcutaneous abscess, but there was no gas. In a unique case reported by Gwyn,[7] in which he repeatedly isolated the organism from the blood during life, there was also no formation of gas.

CASE III. PERFORATING GASTRIC ULCER; GENERAL PERITONITIS, IN WHICH THE BACILLUS AËROGENES CAPSULATUS WAS THE PREDOMINATING ORGANISM.

John D., age twenty-three years. Shipping clerk. Admitted to the service of Dr. Monks, November 25, 1899.

Family history negative. Personal history of no importance, except that for the last two weeks the patient has been indisposed and has lost weight. Has complained of distress after eating; no vomiting; no hematemesis. November 25th, in the afternoon, the patient was suddenly taken with cramp-like pains all over the abdomen. Pain continued until admission twenty-four hours later. No vomiting until after admission. On admission, patient was in much pain, pale and anxious. Pulse 130 and weak. Abdomen immensely distended, tender, tympanitic except in flanks, where there is some movable dulness.

Operation. — The abdomen was opened, and a dirty brownish fluid with much fibrin and gas escaped. Peritoneum red and roughened. The patient failed rapidly and the operation had to be abandoned before the perforation was found. Death occurred two hours later.

Autopsy (U. 99.36) by Dr. Fulton, sixteen hours post mortem, at the undertaker's, in the presence of friends. Partial autopsy only permitted. Organs not removed. Peritoneal cavity filled with a dirty brown fluid. Some gas escaped on opening. Peritoneum covered with scattered flakes of fibrin. Intestines much congested. Here and there are dark areas about one centimetre and less in diameter, apparently hemorrhages into the intestinal wall. Mesenteric lymph nodes enlarged. Appendix normal. Spleen somewhat increased in size and quite soft. Stomach: On the anterior surface is a round opening measuring seven millimetres in diameter, through which gas and stomach contents escape. Stomach much dilated. Permission obtained to remove stomach. The opening mentioned is two centimetres below the lesser curvature; six centimetres from the esophageal opening, and 11 centimetres from the pylorus. Over an area, five by six centimetres, surrounding the opening the peritoneal surface is whitish, opaque, with evidence of slight recent adhesions. From the inner surface the perforation is seen to be funnel-shaped, the inner orifice being 1.75 centimetres in diameter. The walls are very sharply defined, giving the appearance of having been punched out, except that they are slightly terraced, indicating the different coats of the stomach. The wall at this point measures one centimetre thick, thinning gradually for a distance of two to three centimetres from the ulcer. Posterior surface is slightly congested. No other ulceration.

Anatomical diagnosis. — Simple perforating ulcer of the stomach; acute general fibrinopurulent peritonitis; hemorrhages into intestinal wall; hyperplasia of mesenteric lymph nodes.

Bacteriological examination. — A smear from the peritoneal exudate shows vast numbers of large, thick bacilli which resemble morphologically the bacillus aërogenes capsulatus and stain deeply by Gram's method; a moderate number of medium-sized bacilli, and a very few slender bacilli, both of which decolorize by Gram, and a few lanced-shaped cocci or short bacilli, often in pairs, not decolorizing. One culture made from the peritoneal cavity. The medium bacillus noted in the smears gives the cultural characteristics of the bacillus coli communis. After the smear was examined and the large bacillus noted, the tube was cultivated anaërobically (in a Buchner jar). A few large, thick bacilli were found in the water of condensation. This was inoculated into the ear vein of a rabbit, which was killed in fifteen minutes and placed in the thermostat over night. Autopsy the next morning. Animal much swollen and gives off an offensive odor. Peritoneum punctured and gas allowed to escape but cannot be demonstrated definitely to burn. Much subcutaneous emphysema. Gas and a chocolate-brown, oily fluid in the peritoneal cavity. Gas in pleural cavities and large blood-vessels; none in the pericardium. Smears from the subcutaneous tissue, heart's blood, liver and peritoneal cavity show many large, thick bacilli not decolorizing by Gram's method, and with an easily demonstrable capsule. Cultures show the bacillus aërogenes capsulatus, the bacillus coli communis, and an unidentified small bacillus.

In this case of acute general peritonitis the gas bacillus was the predominating organism in the exudate. It has already been well recognized as at least a contributing cause of peritonitis, and Welch and Flexner[4] report a case of peritonitis due to perforating cancerous ulcer of the duodenum in which the organism was obtained in pure culture. They also report three cases of peritonitis due to the perforation of typhoid ulcers in which the gas bacillus was present, but in association with other organisms. They also mention a case of perforating gastric ulcer in one of their stock rabbits in which the peritoneal exudate contained the gas bacillus.

CONCLUSIONS.

Only one of our five cases (Dr. Thorndike's first case) was a pure infection with the gas bacillus. This case shows what marked pyogenic properties the gas bacillus may possess. In three cases the organism appeared to gain entry into the tissues from the gastro-intestinal tract. In two, infection was probably referable to dirt containing the gas bacillus which gained access into the body through wounds of the skin.

Our first case shows how readily the organism may be destroyed by cold.

The lesions produced by the gas bacillus on muscle tissue are most remarkable. This was shown in both the cases of emphysematous gangrene reported by Dr. Thorndike. In some places the muscle fibres were broken into small pieces, varying in size and shape. The fragments were separated one from another and laid in different planes. Their torn edges were distinct; their stria well preserved. The appearance was of débris thrown about by an explosion. In other places degeneration and digestion of the muscle fibres appeared to have taken place. This digestion is shown by the soft, mushy consistence of the muscle fibres, which can be teased apart with the greatest ease.

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Clinical Department.

A NEW METHOD OF INTRA-ABDOMINAL OPERATION FOR RETROVERTED UTERI.

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THE present methods for holding the uterus in position, in cases where the abdomen has been opened, are practically three; namely, folding the round ligament upon itself and stitching the folds together; drawing the two round ligaments into apposition ante-